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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
TATSUYA ANDOH, ET AL. : EXAMINER: ALVO, MARC S.  
SERIAL NO: 10/015,704 :  
FILED: DECEMBER 17, 2001 : GROUP ART UNIT: 1731  
FOR: COOKING METHOD FOR PULP :

DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

SIR:

Now comes \_\_\_\_\_, who deposes, and states that:

1. I am a graduate of \_\_\_\_\_ and received  
my \_\_\_\_\_ degree in the year \_\_\_\_\_.
2. I have been employed by \_\_\_\_\_  
for \_\_\_\_\_ years as a \_\_\_\_\_ in the field of  
\_\_\_\_\_.

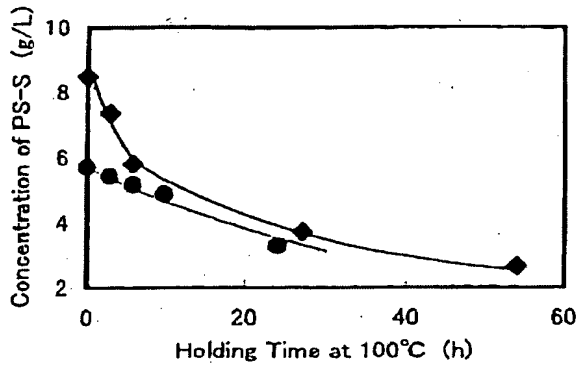
3. The following experiments were carried out by me or under my direct  
supervision and control.

As shown below, experimental results are provided for two studies, Study A and  
Study B. It is noted that the experimental results from Study B were obtained from published  
international patent application WO 00/77294.

## Study A

### Experimental Data

#### 1) Difference in decomposition rate by the concentration of polysulfide sulfur



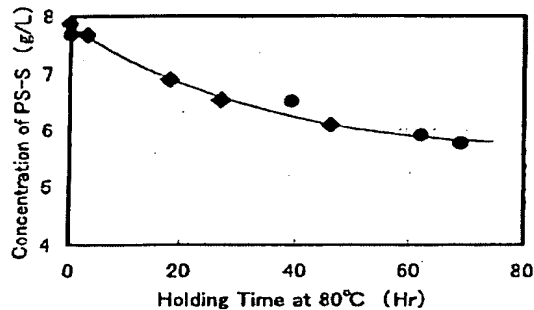
Concentration of polysulfide sulfur  
 (initial stage)

◆: 8.5 g/L as S

●: 5.8 g/L as S

As the concentration of polysulfide sulfur increases, the decomposition rate at the initial stage increases.

#### 2) Influence of the concentration of thiosulfate on the decomposition rate of polysulfide sulfur



Concentration of thiosulfate

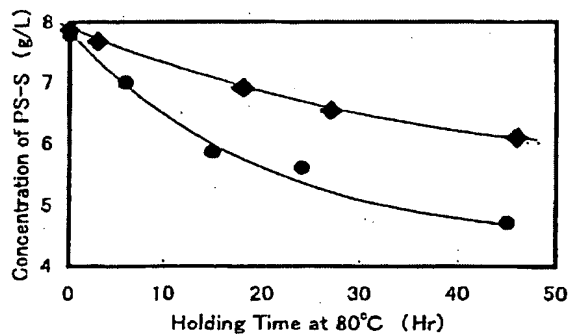
◆: 0.3 g/L as S

●: 4.4 g/L as S

Concentration of polysulfide sulfur:  
 7.89 g/L

The concentration of thiosulfide does not influence the decomposition rate of polysulfide sulfur.

#### 3) Influence of Na<sub>2</sub>S-state sulfur on the decomposition rate of polysulfide sulfur



Concentration of Na<sub>2</sub>S-state sulfur

◆: 15.5 g/L as Na<sub>2</sub>O

●: 9.1 g/L as Na<sub>2</sub>O

Concentration of polysulfide sulfur:  
 7.8 g/L

By increasing the concentration of Na<sub>2</sub>S-state sulfur, the decomposition of polysulfide sulfur can be suppressed.

### Study A – Stabilization of Polysulfide Sulfur

This study shows that by adjusting the Na<sub>2</sub>S-state sulfur concentration to at least about 10 g/l, calculated as Na<sub>2</sub>O, it is possible to suppress the decomposition of polysulfide sulfur, even if the polysulfide sulfur concentration is high.

As shown in item 1), as the concentration of polysulfide sulfur increases, the initial decomposition rate also increases.

As shown in item 2), the concentration of thiosulfate does not influence the decomposition rate of the polysulfide sulfur. However, as shown on item 3), by increasing the concentration of Na<sub>2</sub>S-state sulfur, the decomposition of polysulfide sulfur can be suppressed.

Study B	Comparative Example			Example No. 1
	No. 1	No. 2	No. 5	
Sodium hydroxide (as Na <sub>2</sub> O)	70 g/l	70 g/l	70 g/l	70 g/l
Na <sub>2</sub> S-state sulfur (as Na <sub>2</sub> O)	30 g/l	12.0 g/l	12.0 g/l	13.5 g/l
Sodium carbonate (as Na <sub>2</sub> O)	15 g/l	15 g/l	15 g/l	15 g/l
Sodium thiosulfate (as Na <sub>2</sub> O)	None	3.3 g/l	3.3 g/l	0.8 g/l
Polysulfide sulfur (as S)	None	5.9 g/l	5.9 g/l	8.1 g/l
Added ratio of quinone (based on chips)	None	None	0.05 wt%	0.05 wt. %
Yield of pulp	50.3%	51.0%	53.4%	54.3%
Difference	0.7%		0.9%	

Study B– Cooking Effects of the Polysulfide Sulfur Concentration (Source WO 00/77294)

Experimental Parameters

Chips used: Fagus Crenata Blume

Quinone: disodium salt of 1,4-dihydro-9,10-dihydroxyanthracene

Yield of pulp: cooking test was carried out at several points within a range of the active alkali addition of from 13% to 19%, and based on the result, the yield of pulp at the Kappa number of 18, was calculated.

In the above results, by changing the polysulfide sulfur concentration from 5.9 g/l to 8.1 g/l, the yield of pulp can be improved by 0.9% (see the difference in the yield of pulp between Comparative Example No. 5 and Example No. 1). The improvement of “0.9%” in the yield, is higher than the improvement of “0.7%” (the difference between Comparative Example Nos. 1 and 2), obtained from yield values in the presence and absence of polysulfide sulfur, although no quinone was added in each case.

The “0.9%” increase indicates an effect larger than the effect obtained simply by the increase in the concentration of polysulfide sulfur. Taking into consideration the total pulp production in the world, i.e. 189 million tons/year (the year of 2000), a 0.9% increase in pulp yield translates to a reduction of about 6 million tons of wood chips. Such reduction has a very big impact in terms of the protection of forest resources and improvement of global environment.

4. I declare further that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true, and further that these statements were made with knowledge that willful false statements, and the like, so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

5. Further Declarant saith not.

Respectfully submitted,

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Date